

# Leech therapy for epidermoid cysts and review of the literature

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## Abstract

*Hirudo medicinalis* sucks blood directly through the external mammalian skin. We recently observed a healthy 64-year-old Iranian man, who presented with numerous asymptomatic multilobular oval-to-round well-defined 0.5 to 1.5 cm cystic lesions with central umbilication (central black eschar) over the upper portion of his chest. We made the diagnosis of epidermoid cyst, giant comedone and leech bite on the basis of the constellation of clinical features. The patient was treated with oral ciprofloxacin at a dose of 2 g daily, and 2% topical erythromycin solution. Despite improvement, the evidence of cystic lesions persisted. There was no history of similar lesions in any other family member. There was no history of trauma. The patient was not using any topical or systemic medication. Two weeks before his visit, he had a history of leech therapy under the supervision of a general practitioner. His medical history was significant for leech therapy of the lesions, five days previously. He was followed up for another two weeks and after disappearance of the inflammation, with the patient under local anesthesia, the well-circumscribed mass was completely evacuated with a sharp curette and comedone extractor. The patient was subsequently lost to follow-up. Conclusion: Considering the efficacy of leeches, it would be favorable to breed a germ-free leech. In Iran, the use of the leeches in surgery, in recent years, has been infrequent. It appears that the positive effects of this ancient remedy may now be explained through scientific methods, promising potentially even more uses of this admirable creature in medicine.

**Key Words:** *Hirudo medicinalis*, leech, leeching history

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## INTRODUCTION

Leeches belong to the Phylum Annelids, a group that includes earthworms. The European leech

*H. medicinalis* is the species used most commonly in medical applications. Most live in water, some are amphibians and others are land leeches. Thus, leeches can be found in lakes, ponds, ditches, slow-and fast-moving streams, seas, and the dense vegetation of tropical forests. A leech bite is created by three jaws, each containing 60-100 pairs of cutting teeth, forming the characteristic Y-shaped tri-radiate conformation, 1 mm in diameter and up to 1.5 mm in depth.<sup>[1,2]</sup> In the medicinal leech, the teeth of the three jaws are pored by the canaliculi of unicellular glands, which produce, besides anesthetic and vasodilatory compounds, a

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powerful anticoagulant (hirudin), which acts as an anti-thrombokinase. The saliva also contains substances that dilate the blood vessels to increase blood flow and prevent the blood from clotting.<sup>[1]</sup> The leech normally attacks drinking animals or humans. It enters the mouth or nostrils from water holes, ponds or streams and attaches itself to the mucous membranes of the pharynx, larynx or nostrils. *Hirudo medicinalis* sucks blood directly through the external mammalian skin, usually until fully gorged, and then drops off from its host. Due to this fact a large leech may ingest about 15 g of blood. The blood ingested by starved leeches, amounts to six to nine times their weight in one meal.<sup>[3-5]</sup> The term '*Hirudo medicinalis*' refers directly to the medicinal use of leeches.<sup>[6]</sup> Their current English name is derived from the old English word 'leech', meaning doctor.<sup>[7]</sup>

## CASE REPORT

We recently observed a healthy 64-year-old Iranian man who presented with numerous asymptomatic multilobular, oval-to-round, well-defined 0.5 to 1.5 cm cystic lesions, with central umbilication (central black eschar) over the upper portion of chest [Figure 1]. The lesions were dome shaped and umbilicated. They were soft on palpation and could be depressed only by firm pressure. No scale or epidermal changes were apparent. By squeezing, a yellow greasy material was pushed off from the lesions. He was not taking any medications.

On further questioning, the patient had been treated one week ago with leeches, under the supervision of a general practitioner, for presumed infection. This protocol had led to the inflammation and bulging of the lesions. The punctum of the leech was observed in the center of all the lesions [Figure 1]. On physical examination five dermal nodules ranging from 1 to 6 cm in diameter were observed on the chest [Figure 1].



**Figure 1:** Central umbilication (central black eschar) over the upper portion of chest

Review of systems produced negative results. The patient had no pain or any other symptom. A skin examination did not reveal any other abnormalities. There were no palpable lymph nodes. A routine blood test was within normal limits.

There was no history of similar lesions in any other family member. There was no history of trauma. The patient was not using any topical or systemic medication. Two weeks before his visit, he had history of leech therapy under the supervision of a general practitioner.

His medical history was significant for leech therapy of lesions five days previously.

We made the diagnosis of inflammatory epidermoid cyst, giant comedone, and leech bite on the basis of the constellation of clinical features. The patient was treated with oral ciprofloxacin, at a dose of 2 g daily, and 2% topical erythromycin solution, based on smear testing that showed gram-negative colonization, probably *Aeromonas Hydrophila*. The inflammatory component of the cutaneous lesions resolved ten days after administration of ciprofloxacin and withdrawal of leech therapy. Despite improvement, evidence of the cystic lesions persisted.

He was followed up for another two weeks and after disappearance of the inflammation, with the patient under local anesthesia, the well-circumscribed mass was completely evacuated with a sharp curette and comedone extractor. The patient was subsequently lost to follow-up.

## DISCUSSION

Over the centuries, leeches became more popular than the painful mechanical methods of blood-letting. Bloodletting was one of the most common therapeutic methods in Greek, Greco-Roman, and Byzantine medicine. The methods used for this purpose were cupping, venesection, and application of leeches. Each method was used in different cases, depending on the desirable amount of blood to be extracted and the part of body affected. The first use of leeches for medical purposes appears on the wall of an Egyptian tomb (1567-1308 BC).<sup>[6]</sup>

Galen (130-201 AD) used leeches for bloodletting, which was based on the belief that removal of the patient's blood would correct the humoral imbalance and restore good health.<sup>[8]</sup> In the nineteenth century, leeching (hirudotherapy) recommended as a popular treatment, exhibited a number of old complications.<sup>[9]</sup> Leeching was largely abandoned as medical science

advanced, only occasionally being called upon to treat minor bruising, such as the treatment of black eyes.<sup>[9]</sup> Leeching is used for diverse medical problems such as chronic pain syndromes associated with degenerative disease, removal of blood in the periorbital edema, severe postoperative macroglossia, satyriasis or priapism, and in purpura fulminans.<sup>[10-16]</sup> Leeches are helpful in cases of nasal congestion. In the latter case, leeches were to be applied to the tip of the nose to extract the blood gathered there.<sup>[16]</sup>

Although medicinal use of leeches was declined after the mid-nineteenth century, newer techniques, especially in plastic surgery, have resulted in the recent emergence of medical leeching as a useful adjunct for venous congestion.<sup>[1,17-19]</sup> Skin flaps are commonly utilized by plastic surgeons to reconstruct deep defects in the soft tissue, where a patent vascular bed is absent. Smoot *et al.* showed an increase in the perfusion of flaps with the use of leeches.<sup>[20]</sup> It is hypothesized that leech therapy allows for a minimal nutritive blood flow to the compromised tissue until neovascularization around the margin of the flap can be established.<sup>[21]</sup> Peer-reviewed evidence suggests that the survival of compromised venous-congested tissue is improved by the early application of leeches.<sup>[22-24]</sup> In 2004, this treatment modality received the approval of the Food and Drug Administration (FDA) in the USA.<sup>[25]</sup>

However, the potential problems that arise with the use of the medicinal leech are psychological and pharmacological in nature. A leech causes bleeding and swelling of the invaded organs, may interfere with swallowing and breathing and can lead to anemia or even death. Continued leech use and persistent bleeding from the wound can result in a significant loss in blood volume. Hemoglobin levels can drop by 1-2 g% over a five-day treatment due to the amount of blood loss, thus requiring a blood transfusion.<sup>[26]</sup> Some patients experience anaphylaxis and allergic responses to the bioactive saliva of leeches, while others exhibited excessive scarring from the bite wound site.<sup>[17]</sup> The cutaneous lesions subsequent to the application of leeches are probably due to the combined action of different enzymes produced by their salivary glands: hirudin and fibrinase.

Hirudotherapy has been complicated by infections caused by *Aeromonas spp.*, which are considered to be obligatory endosymbionts of the leech.<sup>[1]</sup> The potential for leeches to cause infection with *Aeromonas hydrophilia* was first reported in 1983.<sup>[27]</sup> The exact incidence of leech-associated infection associated with postoperative use is difficult to assess, with incidences ranging from 2.4% to 36.2%, which are reported

in the literature.<sup>[22,28-31]</sup> Infections with *Aeromonas* have been observed in 7-20% of the patients treated with leeches after reconstructive surgery; in these cases the chances of successful re-implantation or flap survival dropped by 30%. Therefore, antibiotics are given prophylactically for the duration of the treatment.<sup>[8,22]</sup> High levels of resistance to first-generation Cephalosporins, Penicillins, Tetracyclines, and Augmentin in have been observed in studies, whereas, fluoroquinolones seem to be consistently active.<sup>[8,22,29,32-40]</sup>

The most common clinical presentation of *Aeromonas* infection in humans is of cellulitis, often with a foul odor, complicated by subcutaneous abscess formation.<sup>[41,42]</sup> In severe cases, extensive tissue loss and septicemia have been reported.<sup>[43]</sup> *Aeromonas* seems to have an affinity for muscle tissue, and is capable of producing extensive proteolytic enzymes leading to a picture resembling clostridial myonecrosis with gas production. Leeches are also a potential source of transmission of blood-borne infections to other patients and staff. As they vomit ingested blood when mishandled, it is possible, in theory, that they transmit infections such as hepatitis and AIDS.<sup>[44]</sup> In immunocompetent patients, surgical infections due to leech application may result in additional antibiotic therapy, extended hospital stays, rehospitalization, or removal of nonviable tissues.<sup>[31]</sup> As one would expect, neutropenic and immunocompromised patients seem to be more at risk. Leech-borne infections are by no means heterogenous in presentation; delayed presentations have been recently reported in escharotic flaps, and a case of meningitis due to leech-borne infection has previously been reported.<sup>[40,45]</sup> Of the highest concern to microsurgeons is the ability of *Aeromonas* to invade the walls of the blood vessels with resultant vasculitis, thrombosis, and hemorrhagic necrosis.<sup>[46]</sup>

## CONCLUSION

Until the beginning of the second decade of the twentieth century, physicians supported the use of leeches. On account of the possible adverse complications, leeches are not currently employed as a prophylactic therapy. Considering the efficacy of leeches, it would be favorable to breed a germ-free leech. Farmed varieties rather than (wild) leeches should be used, but even then, the potential hazards of bacterial and viral infections should be kept in mind. In Iran, the use of the leeches in surgery, in recent years, has been infrequent. It appears that the positive effects of this ancient remedy may now be explained through scientific methods, promising potentially even more uses of this admirable creature in medicine.

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